Redfish

May, 2012 (Issue #11)

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Tropical

The Magical Dwarf Gourami

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Darwin Red Nose Shrimps!

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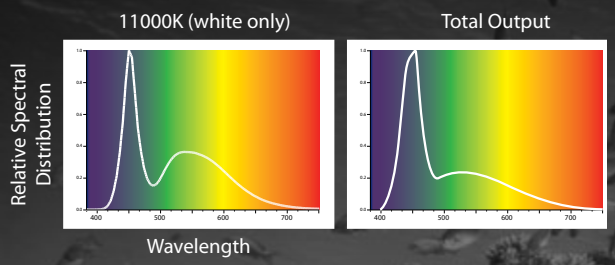

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About Redfish

Redfish is a free-to-read magazine
for fishkeeping enthusiasts.

At Redfish we believe in the free exchange of information to facilitate success by aquarium and pond hobbyists. Each month Redfish Magazine will bring you dedicated sections on tropical, coldwater, marine and ponds.

Redfish was founded in early 2011 by Jessica Drake, Nicole Sawyer, Julian Corlet and David Midgley.

We hope you enjoy this, the eleventh issue of Redfish.

古池や蛙飛込む水の音
ふるいけやかわずとびこむみずのおと

Photo courtesy: (matt)

The Fine Print
Redfish Magazine

General Advice Warning

The advice contained in this publication is general in nature and has been prepared without understanding your personal situation, experience, setup, livestock and/or environmental conditions.

This general advice is not a substitute for, or equivalent of, advice from a professional aquarist, aquarium retailer or veterinarian.

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Dwarf Gourami

EXPECT BIG THINGS FROM THIS LITTLE FISH

Trichogaster lalius (Colisa lalia)

Natural habitat

The Dwarf Gourami is native to India, Bangladesh and Pakistan, and some literature indicates its range extends possibly as far as Myanmar, Nepal and Borneo. It is found in the tributaries of the Ganges and Brahmaputra rivers, in slow moving streams and lakes. The Dwarf Gourami, like other Gourami, is a labyrinth fish, meaning it can breathe air as well as water. This allows them to survive in still water, which can be low in oxygen. It has been introduced, often deliberately to Colombia, Singapore, Taiwan and Florida in the United States of America and is probably established in these countries. It has also been introduced to The Philippines but does not appear to have established. Today the vast majority of Dwarf Gourami are raised through aquaculture throughout South East Asia.

Smaller rivulets, backwaters and ponds - like this example in Bangladesh - are the typical habitat of the Dwarf Gourami.

In the aquarium

Dwarf Gourami make ideal community tropical aquarium specimens. The recommended temperature range for this fish is 25 – 28 degrees C. A pH of between 6.5 and 7.5, with a hardness of no more than 15 dGH is suitable for maintaining the adults specimens. The Dwarf Gourami seems to be particularly susceptible to nitrites, hence a good filter and regular water changes should be used to prevent the build up of nitrites, and to help keep a general level of cleanliness. However, this fish comes from sluggish waterways and should not have turbulence in all parts of the aquarium. The Dwarf Gourami comes from water with dense vegetation, so it is best kept in well planted aquariums that provide plenty of cover and protection. Dwarf Gouramis can be skittish when subjected to noise, sudden flashes of light or movement. As such their aquarium is best kept in a quieter location. It is also worth noting that Dwarf Gourami, while generally fairly disease resistant, can be prone to a viral infection from the Iridovirus family, called Megalocytosis virus. This virus has attracted the attention of Biosecurity departments across the

Males are brightly coloured, often with stripes of red and irridescent blue spots. Females are silver-brown in colour.

world, including plans to restrict the future importation of this species and even the entire Gourami family. There is currently a concerted effort to eradicate this family of viruses from the aquaculture of this species. While there is no cure for viral infections like Iridovirus , when buying dwarf Gouramis avoid any fish that exhibit any reddening around the eyes and mouth or any fish that exhibit any lesions appearing anywhere on the body. Iridovirus is not harmful to humans.

Colouration, size and dimorphism

The common name fits this fish well, as it only usually reaches a size of 5-6cm (around 2 inches), males grow slightly larger than the females. Wild form Dwarf Gourami have a bright orange to red body with turquoise blue vertical stripes extending into the fins. The dorsal fin of the male is pointed, in contrast to the more rounded dorsal of the female. Females remain a duller silvery blue-gray color.

Due to selective and line breeding, Dwarf Gourami are available in a range of colour morphs/forms, including Blue Dwarf (Powder Blue), Neon Dwarf, Rainbow Dwarf, and Red/Flame Dwarf. It is important to note that these colour forms are not hybrids, however, they are not found in the wild. Powder Blues are predominately a vibrant light blue with only a little red showing on the body. Neons display brighter blue stripes when compared to the standard variety. Rainbows have especially brilliant orange-red bodies with blue stripes, along with a green-gold metallic sheen. Reds are almost solid red throughout the body, with a blue dorsal fin.

Diet

Dwarf Gourami are omnivores, in their natural habitat they eat small insects and larvae from the surface of the water, as well as grazing on algae growth on plants.

In captivity they will usually accept high quality prepared foods such as flakes, micro pellets and crumbles. To maintain good health and best colouration, their diet should be supplemented with regular feedings of live foods such as blackworms or frozen foods such as bloodworm, daphnia, Cyclops and brine shrimp. Live foods should also be used to condition breeding pairs to prepare for spawning..

ABOUT THE AUTHOR

Pip Court

Pip has been keeping ornamental fresh and saltwater fish for the past 22yrs. Pip's hobby passion is so great that she has spent the last ten years working for both aquarium wholesalers and retail outlets, and currently manages Reef River Reptile, in Sydney Australia. Pip has travelled to both Europe and Singapore to attend major trade shows, Interzoo and Aquarama respectively, where she was also able to visit numerous fish farms and wholesalers.

A range of colour forms are available. All are via selective breeding. Photo by Budi Lukman.

Compatibility

Dwarf Gourami are well suited to smaller (nano) tropical aquariums, as well as larger community tropical aquariums alike, due to their peaceful nature. They should not be kept with very large or aggressive fish. Provide plenty of vegetation, including floating plants that cover part of the surface of the water. It is also of paramount importance that Dwarf Gourami are not kept with nippy species such as Tiger Barbs and their allies , Leporinus and Serape tetras as these species can harass the more peaceful Gourami, including nipping their trailing fins and outcompeting them for food.

A Dwarf Gourami bubble nest. Floating plants are useful in breeding as it stabilises the nest. Photo by Dunkelfalke @ Wikipedia.

Reproduction

Part of the attraction of Dwarf Gourami is their ability to successfully spawn and raise their fry in the home aquarium. Observing the breeding process is both fascinating and educational, from the construction of a bubble nest, the elaborate courtship and spawning process to watching the male alone tend to the nest and raise the fry. Other fish, even small ones are likely to interfere with the breeding process and for best outcomes, when breeding other tank mates should be removed. Lowering the water level to 6-8 inches and raising the water temperature to 28-30 C can trigger spawning. Vegetation is essential, as males build their bubble nest using plant material, which they bind together with bubbles. Nests are very elaborate and sturdy, reaching several inches across and up to an inch deep. *Limnophila aquatica*, *Riccia fluitans*, *Ceratopteris thalictroides*, and *Vesicularia dubyana*, are good choices for the breeding tank. Peat fiber may also be offered as building material.

Once the nest had been built the male will begin courting the female. He signals his intentions by swimming around the female with flared fins, attempting to draw her to the nest where he will continue his courting display. If the female accepts the male she will begin swimming in circles with the male beneath the bubblenest. When she is ready to spawn she touches the male on either the back or the tail with her mouth.
Upon this signal the male will embrace the female, turning her first on her side and finally on her back. At this point the female will release approximately five dozen clear eggs, which the male immediately fertilizes. Most of the eggs will float up into the bubblenest. Eggs that fall are collected by the male and placed in the nest. Once all the eggs are secured in the nest, the pair will spawn again. If more than one female is present in the breeding tank, the male may spawn with all of them. The spawning sessions will continue for two to four hours, and produce between 300 and 800 eggs. Upon completion, the male will place a fine layer of bubbles beneath the eggs, assuring that they remain in the bubblenest. At this point the female(s) should be removed from the tank. The male will now take sole responsibility for the eggs, aggressively defending the nest and surrounding territory. In twelve to twenty-four hours the fry will hatch, and continue developing within the protection of the bubblenest. After three days they are sufficiently developed to be free swimming.The male should be removed from the tank once the fry have left the bubblenest or he may consume the young. Fry should be fed micro-food such as infusoria, rotifers, or commercial fry food for the first week. They can then be fed freshly hatched baby brine shrimp, and finely ground dry foods.

Conclusion

Dwarf Gourami make the near ideal community tropical aquarium inhabitant. What more could one ask for, they are peaceful, able to tolerate a variety of tank mates and live in aquariums both small and large alike. They are colourful offering a variety of metallic hues of red and blue to choose from. Dwarf Gourami also offer the ability to observe the unique behavior of labyrinth fish, able to breath air like you or I and the amazing attention to detail when spawning including the detailed construction of bubble nests. If you have not yet had the pleasure of keeping this iconic aquariums species then I highly suggest you visit you local aquarium shop and take a look at the variety and colours of dwarf Gourami on offer.

by Lea Maddocks

darwin red-nose shrimp

a novel and hardy native Australian Shrimp.

Keeping small freshwater shrimp (of the order Atyidae) has taken off dramatically in the aquarium hobby in the last decade. Not only do they often make good algae cleaning crews in smaller tanks, but they can add a lot of activity and colour for a comparatively low bioload. Today the colour and forms available in the hobby (often developed via selective breeding) are truly impressive, with many varieties making beautiful additions to peaceful community tanks or striking shrimp only displays in planted aquaria. Indeed, the interesting behaviours and novel appearances of these shrimp are endearing to many, even converting some aquarists to exclusive shrimp keepers and breeders.

DRNS spend much of their time browsing on the biofilm of organisms that grow on the surface of leaves. Photo by Budi Lukman.

One of the key genera familiar to shrimp hobbyists is *Caridina*, which include the famous Amano shrimp and the very colourful Bee and Taiwan Bee shrimp strains such as the Crystal Red and Crystal Black shrimp and various Tiger shrimp colour morphs. A relatively new addition to the hobby from this genus is an unusual and currently scientifically un-described species of Australian native, *Caridinia* sp. 'Gulf1', or the Darwin Red Nose Shrimp (DRNS). These shrimp are approximately 2 - 4cm in length, though usually 2 - 3cm in aquaria, with males being smaller than the females. Both sexes possess a transparent body with tiny white flecks on the tail and a few on the body, and a yellow line running from head to tail which is chiefly the dorsal abdominal artery as seen through the carapace. The crowning glory of this shrimp is a long red protrusion, called a 'rostrum', which extends from the head where one would imagine a 'nose' should be. This gives the shrimp its common name.

Occuring in the region around Darwin on the north coast of Australia, these Australian native shrimps require tropical conditions and won't tolerate coldwater.

Origins and Discovery

The DRNS is endemic to the very northern regions of Australia within the Northern Territory (NT) and Queensland (QLD). It has been collected as far east as the Wenlock and Archer Rivers in QLD on the Cape York Peninsula, and west to the Finniss and Daly Rivers in the NT, which are roughly 60km and 150km south west of Darwin respectively. Samples have also been collected in the NT at the Blackmore, Douglas, Adelaide and Mary Rivers, and at Coomalie Creek. These shrimp have also been found as far south as the Cloncurry River between Mount Isa and Cloncurry (Flinders Catchment) which are located far

Swamps, creeks and rivers in the Northern Territory are the places the DRNS calls home .

inland in western QLD.

Until 2007, DRNS were mis-identified as *C. gracilirostris* (Rhino or Mosquito shrimp) which is found in both India, Bali and Australia. Indeed, though these shrimp look nearly identical, studies of genetic relationships (cladistics) between Indo-Pacific *Cardinia* species published in 2007 by Dr Tim Page of Griffith University clearly demonstrated that these shrimp are a distinct species. However, they are still part of a series of closely related clades (groups of genetically related species) which includes *C. gracillirostris* strains from both Bali and Australia. Interestingly, results seem to show DRNS being more closely related to the Bali strain than the Australian strain. While DNRS are very similar in appearance to Rhino shrimp, they differ slightly in a few physiological traits. Rhino shrimp posses small spike clusters on the rostrum and a bright red line running laterally down the body, which can also have a slightly bluish hue. These features seem to be absent in DRNS, and instead the body is more transparent with some white flecking on both body and tail. Breeding requirements for the two also vary, with Rhino shrimp requiring a brackish larval stage, whereas DRNS have been shown by David Wilson from Aquagreen and a handful of hobbyists (including myself) to breed and grow through to adulthood successfully in fresh water. The absence of a brackish stage is also implied by observing these shrimp living far inland in freshwater creeks and rivers. Like most *Caridinia*, these shrimp also do not appear to have a larval stage (though this is not confirmed), with new tiny shrimp resembling miniature adults often found in breeding ponds and aquariums.

ABOUT THE AUTHOR

Lea Maddocks

Lea Maddocks has been a long-time fish enthusiast, SCUBA diving since age 15. A biologist (BSc, Hons, MPhil), Lea has a fascination with aquarium science including fish and invert husbandry, planted aquariums, reefs, and the art of aquascaping. Lea now operates Acumen Aquatics (www.acumenaquatics.com) providing aquarium installs, assistance, and maintenance; supplies her own FinSafe betta ornaments; is an active member of the Canberra District Aquarium Society, contributes to several fish and aquatic plant forums; and has written for the Australian RSPCA on the nitrogen cycle, goldfish and betta care. Lea owns three planted tanks, and routinely maintains many freshwater tanks, a turtle tank, a marine reef, and is a volunteer worker at the National Zoo & Aquarium in Canberra - in the aquarium section of course.

Care

These shrimp are fun to keep, relatively easy to care for, and will thrive in most home aquaria providing a few basic conditions are met. Like all shrimp, they are best kept in groups. For a small colony of 5 - 20 individuals, tank size should be no less than 10L (~2.5 gallons), and ideally 20L (~5 gallons) or above to ensure enough space for a small colony of shrimp to move about freely and provide enough water volume to maintain a low nitrate level and prevent rapid fluctuations in water quality and temperature. A heater is an essential, and while exact parameters are not precisely known, a tropical temperature of 24 – 30 C is recommended as this would be within the temperature range experienced in their native waters. Gentle filtration for mechanical, chemical and biological filtration is strongly recommended, and a filter which is able to provide current and good oxygenation is ideal, as a high dissolved oxygen content appears to be a requirement for these shrimp to breed successfully. Air driven sponge filters would be suitable and prevent small shrimp from being sucked into filter intakes. Alternatively, a HOB (hang on back), trickle or power filter with venturi or powerhead used for both surface agitation and current would also work, providing intakes are covered with a slip of sponge or even pantyhose to protect shrimplets.

Another critical addition to your DRNS tank is a moderate to heavy cover of live plants. These provide not only essential natural cover which shrimp need to feel secure and hide in after moulting while their new exoskeletons harden, but also a source of food. DRNS will be seen frequently consuming biofilm/periphyton from the leaves and stems, and will also eat many types of algae, leaving plants intact. The may also possibly consume brown algae (diatoms), and will scavenge dying leaves, though dead or rotting leaves should be removed to prevent fouling of the water. These shrimp will also take algae wafers, blanched vegetables, cooked and skinned peas, and uneaten fish food. I've personally never seen my DRNS eat anything but biofilm/periphyton, algae and the odd chunk of skinned and cooked pea, as my male betta who also occupies the tank makes short work of any fish food before it hits the bottom. Even without supplemental food my DRNS obviously thrive regardless. I see moulted shells regularly, which indications the shrimp are growing,

and the females are almost always carrying eggs (or 'berried').

These shrimp also seem to be quite adaptable to a range of water parameters, being found from brackish estuaries to freshwater creeks, demonstrating a tolerance of pH between at least 7 to 8, as well as an adaptability to most hardness levels from brackish to soft. Regardless, I prefer to avoid extremely soft water and harden my water to at least 5 GH to provide dissolved calcium and minerals for exoskeleton development. Excellent water quality is recommended for good health. However, while I've not risked my shrimp at high waste levels to observe tolerances to dirty water, they do seem to ship well and thus are also likely to be quite hardy even in this respect (I've received two shipments of 10 -15 shrimp from Darwin to Canberra with only ever one shrimp lost en route). However, like any natural system or well cycled tank, it stands to reason that ammonia and nitrites should be kept to 0ppm, and nitrates less than 20ppm, though 10ppm or under is commonly recommended for most shrimp and indeed my DRNS thrive at my tanks current nitrate level of 5ppm. If your tank possesses nitrates levels above 20ppm, these can be brought down somewhat by adding more live plants, which will consume nitrates as fertiliser and be welcomed by your shrimp for further refuge and grazing. Naturally, reducing numbers of other live stock and/or increasing the number of partial water changes will also greatly assist in improving water quality for your shrimp and fish alike.

Densely planted tanks make ideal homes for these amazing inverts. Photo by Budi Lukman.

Breeding

DRNS will breed in both brackish and freshwater. This is evidenced by finding these shrimp in both brackish areas including tidal estuaries and in fresh inland creeks and rivers. Healthy females are frequently seen berried with green eggs, though raising shrimplets successfully seems to be more of a challenge with this shrimp. Requirements for successful breeding in freshwater in the home aquaria include keeping the shrimp in excellent water conditions with a good current that is well oxygenated, and with a good mass of live plants. David Wilson from Aquagreen, who was one of the first to crack breeding of DRNS, had great success with adding current and additional

oxygenation to his breeding pools. A considerable amount of plant biomass or the presence of green water and leaf litter or plant detritus also appears to be critical his breeding success.

In my personal experience, excellent water quality, good oxygenation and a heavy plant load also seems to work (though I may well have had more success if it were not for the male betta, who may be picking off a few shrimplets). In my own set-up, I have a very large mass of java moss and lacefern/watersprite (*Ceratopsis thalictroides*), as well as a large piece of driftwood. I have seen both adults and larger juveniles grazing on both wood and plants, and can conclude that either microfauna or biofilm/periphyton or other detritus present on these are being consumed by the shrimplets. Plants such as java moss are highly recommended in breeding tanks, as they have a large surface area for grazing and provide a maze of tangled strands for hiding and moulting in the early days.

Enjoying your shrimp

Once you've set up your small cycled and planted tank, slowly acclimatise your DRNS and give them a few days to settle in. Once they've adjusted, they will explore their new surroundings and from then on be forever out and entertaining you with their constant clambering over plants and swimming around the tank. These are a rewarding shrimp to keep, and co-exist peacefully with most fish which are peaceful and not large enough to eat them. With the right set up and a bit of luck, you may also be seeing shrimplets joining your colony in a month or so.

If not, contact David Wilson from Aquagreen in Darwin, who is currently the chief source of DRNS in Australia. Not only can you obtain some more healthy specimens, but also a great selection of other native fish and plants to complete or complement your set-up. Many thanks to Dave for his information on his breeding experiences for this article, as well as Dr Tim Page from Griffith University for providing some collection data and journal articles for further research. All in all, if you are after a native touch for your tank, or something a little unusual, then you can't go past the Darwin Red Nose Shrimp. A top little shrimp from the Australian Top End.

With translucent bodies with their red and white flecks, the DRNS is endlessly fascinating!
Photo by Budi Lukman.

First Time at Sea
a reefkeeping journal

Ok, so here goes nothing. I'm making the switch from freshwater to reef. Before I start though I think I owe you a bit of background information so you know where I'm coming from and where I've been. Professionally, I'm a research scientist with a PhD in microbial ecology. I primarily work with microbes that live in the subsurface - so we're talking about anaerobes - more on those later and in subsequent articles. I've been in the fishkeeping game for around 20 years now. In that time I've kept and bred a range of freshwater fish in a variety of setups. I've had in my care most of the typical freshwater aquarium types - having kept community tanks, planted tanks and various cichlid aquaria. The latter were my passion for the better part of 15 years and during that time I kept a range of species from tiny shell-dwelling lamprologines from Lake Tanganyika to huge predatory guapotes from Central America. I'm not certain how much these experiences are going to help - as I'm discovering the world of reefkeeping is very different to freshwater fishkeeping.

Like most fishkeeping journeys this one starts with a tank. For this I have an Aqua One setup, the AquaReef 300. The AquaReef comes with an alloy frame and plastic panels to resist corrosion. It has a built in overflow, sump and comes with protein skimmer along with quad T5 lighting. It's all rather slick. As it comes in the box, the sump has an over-and-under design with water alternately disappearing under and over glass partitions.

The AquaReef 300 I have setup at home. One month in,live rock is in and we're cycling - giving helpful bacteria time to grow.

For those non-marine folk a very brief description is probably warranted, as sumps and overflows are pretty uncommon in the freshwater hobby. Essentially, a sump is a second aquarium that sits below the main tank, water is pumped

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AquaReef 275	275L	70 L x 70 D x 77/79 cm H

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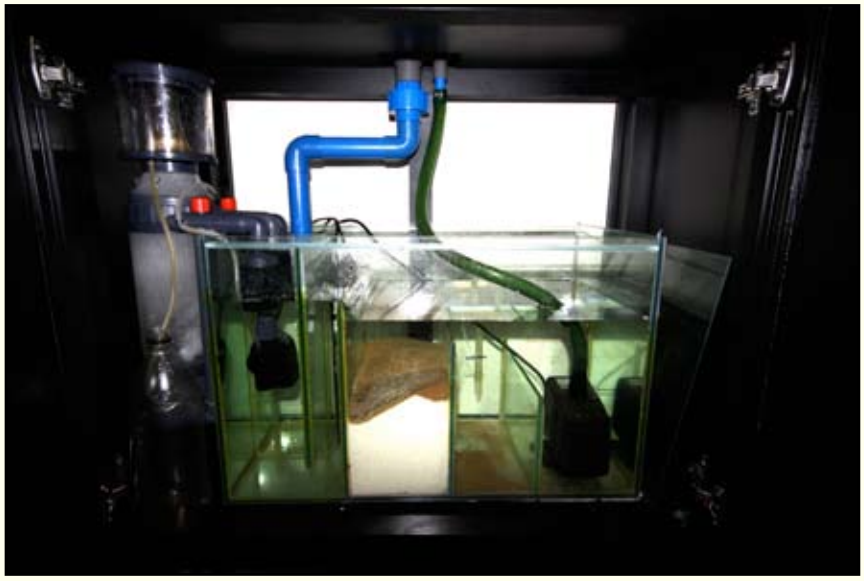
from the sump into the display aquarium, whereupon it overflows (falls) into the weir (a kind of closed off section of the display tank) and returns to the sump via a hole drilled in the base of the aquarium. Such sump and main tank setups are commonplace in the marine hobby, indeed sometimes the sump is considerably larger than the main aquarium! Their appeal should be pretty obvious, most of the gadgetry of aquarium keeping is neatly hidden away beneath the aquarium and additionally it gives you a greater water volume, which in turn equals better stability of water chemistry.



The sump is a great hiding place for all the gadgets required for fishkeeping. This is pretty much how it comes out of the box, though I've adjusted the under-over arrangement of the glass partitions in the sump so I can install a deep sand bed in one compartment in the sump. The DSB is filled with ~1mm aragonite to a depth of ~10cm. A small amount of live sand (around 500g) from a colleagues aquarium has been added to the top of the bed to seed it. The AquaReef 300 comes with a Protein Skimmer which rather neatly attaches to the side of the sump - saving you space in the sump itself. I could have removed the glass partion next to the pump but I elected to leave it for now to help stop any "overflowing" sediment reaching the pump itself.

In the case of the AquaReef 300 the sump features several compartments, through which the water is forced to flow on its way to the return pump. The design out of the box is a typical under-over-under arrangement, where water flows alternatively under then over glass partitions within the sump. It comes with bioballs in one of the sections. I elected to remove the bioballs and move one of the partions down to the base of the sump, such that I could create a section filled with water that the water flowed across rather than under. In this section, I've been planning to install a remote deep sand bed (DSB). To get this underway I filled this partition with AquaOne New Pacific Coral Aragonite to a depth of ~10 cm or so. The grain size of this product is around one millimetre, so it's slightly larger than the "sugar fine" sands used in some DSBs. The reading I've done suggests a grain size of around 1mm will still work, though it may not be able to maintain the diversity of life a finer sediment would -- time will tell and I'll certainly be reporting on its progress month-by-month.

Protein skimmers are an interesting piece of kit that wont be familiar to freshwater hobbyists making the switch. I might save a detailed explanation of their functioning for a future entry

- but essentially you can think of the skimmer as a method by which substantial organic waste can be removed from the water BEFORE it breaks down into simpler compounds (like ammonia)... thus lightening the load on the biological filter in the tank.

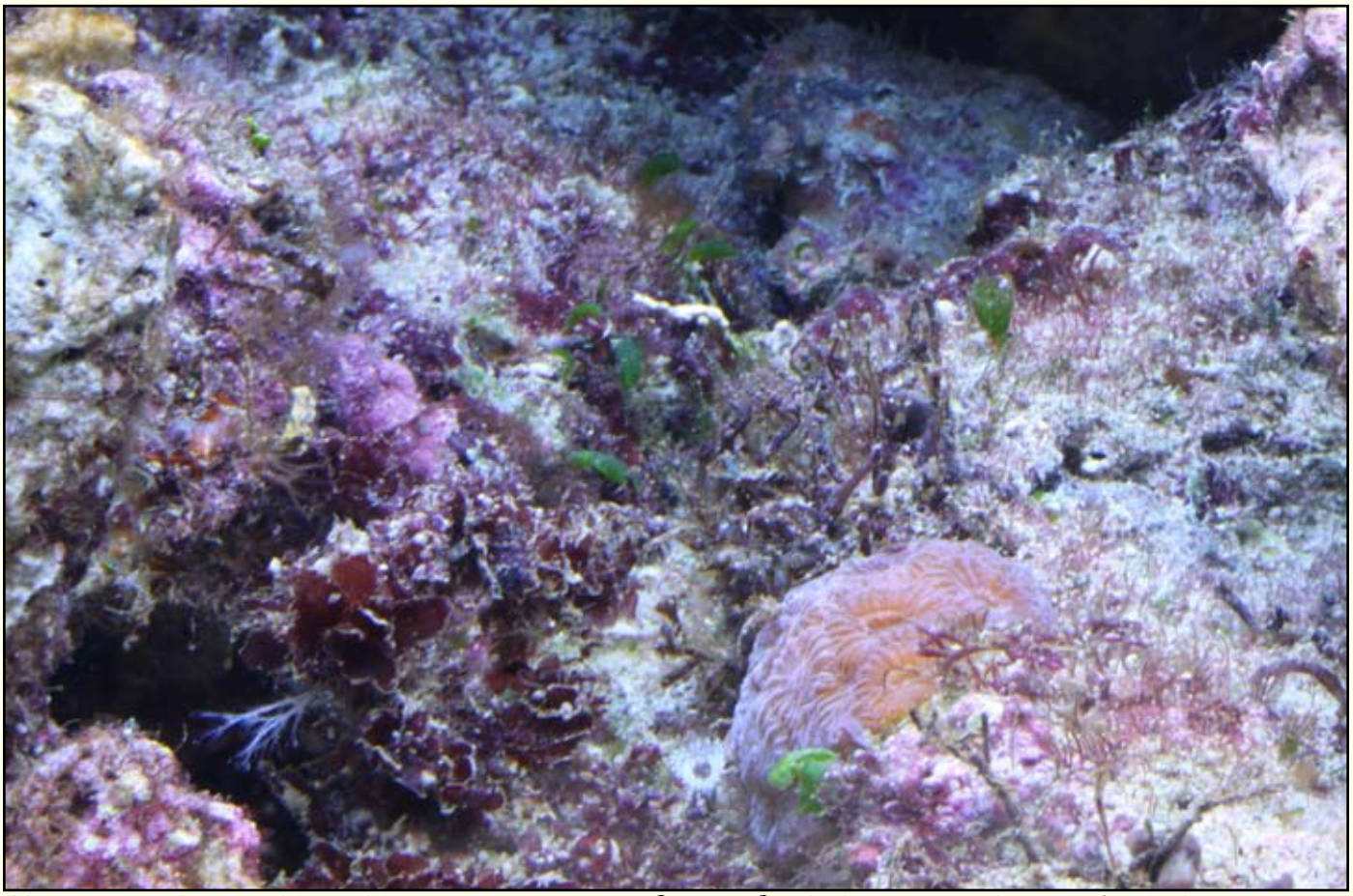
There are numerous brands of sea salt on the market, I'm using AquaSalt from AquaOne. Like most good quality salts, it dissolves easily - matches natural seawater well - and doesn't contain nitrates or phosphates which can foul your aquarium.

After getting the rest of the components and plumping in place (in the AquaReef 300 this is mostly completed for you) it is time to fill the aquarium and the first really new question is already upon me. How do I fill up a 300 litre aquarium with salt water? As it turns out there are two answers and it's a contentious issue in the hobby: seawater or synthetic seawater. Having weighed the choice, I've elected to use synthetic seawater. That way I have a degree of control over the chemistry of the water at each water change and can at least be consistent. This creates yet another quandry, what sort of water do I use to dissolve the salt? The wisdom on the internet varies and there's much debate around the issue. Some aquarists advocate that only purified water (deionised, reverse osmosis (RO) or distilled) be used to make up your saltwater, while others suggest that tap water (municipal) water is fine provided a dechlorinator is used. I'm new to this, so I dont know where I stand, though it seems likely that IF you're sure the municipal supply is clean, your sure your pipes are clean (that is, they aren't leaching nasties into the water) then tap water is probably fine. That said, I'm not sure how you could be sure about either the municipal supply or your pipes -- so it's probably better to err on the side of caution and stick to purified water.

So having filled my new tank with RO water and watching it overflow satisfyingly into the sump, it's time to add the salt - the dose rate is broadly similar for all salts, around 36g per litre. As I dont have anything living yet in the aquarium I simply added the salt to the aquarium and allowed the pumps to move the water, dissolving the salt. Its all pretty satisying actually - though it makes you realise just how salty salt water is! While I'm on the subject of pumps, I'm using twin Seio Propellor pumps (rated to 3800 litres / hour) to circulate water in my display tank.

These provide the turbulence required in a reef aquarium, ensuring good water movement in the display. I added two heaters to the sump, set them to 26° C and sat back to admire my work then allowing the tank to warm, and get to the appropriate salinity.

Twenty fours later, and the water is warm, salinty on my hydrometer reads around 1.025 -- I headed off for my first batch of live rock. It's been sent down to Sydney from the marine gurus at Cairns Marine in tropical North Queensland. Before getting into the life that the rock supports it's worth mentioning that some care should be taken not to overload the aquarium. Live rock



Live rock is, quite literally crammed full of living organisms. In this small section you can see various macro algae, a tube worm, coral and some sponges. The rocks themselves are honeycombed with tiny caves, channels and cracks that are home to a myriad of worms and other microinvertebrates.

has a high bioload and the uncured rocks can overwhelm a new tank. So tread cautiously. For the uninitiated, live rock is carbinaceous rock that's been in a marine (normally reef) environment for a while. It is literally covered in life from almost all of the animal groups. It's not limited either to sessile (not mobile) animals and plants -- mobile invertebrates are also common on live rock. To date I've spotted numerous species of Brittle Stars, the larger individuals (of which I think there are two) are probably Ophiocoma paucigranulata (the Spiny Brittle Star), smaller individuals are too numerous to count. They seem to occupy almost every rock - often with their legs pertruding during the day. The live rock I have to date (shown overleaf, right) is also host to at least 4 (maybe 5) species of corals. Most are very small and weren't noticeable for the first few days on the

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rocks. Once they've settled in though they've taken to emerging each day to feed. One colony of Glove Polyps, *Clavularia* sp. rapidly emerge once I turn the lights on each day, their frond-like tentacles claw at the water, finding small phytoplankton (of which I'd imagine there is plenty during this phase of the aquarium cycling) in the water column. There's two other small coral colonies (overleaf). I'm not sure what species either is - and would welcome discussion on our Facebook page.

Similarly, one small piece of live rock was host to quite a large group of zoanthids. These are tan coloured and what I'm assuming is Palythoa. My quick (and inept) googling shows many similar species - so I wasnt sure what exactly these where. The largest of these polyps is about 1cm across. The rock with the tan-coloured zoanthids is also home to a few Brittle Stars and their legs can be seen hanging out of their hide-outs in the bottom-right of the image.

These inhabitants aside, I've seen tiny sea-slugs, various snails I can't identify, two Mantis Shrimps (one of which I managed to remove), at least three species of Anemone (one of which was Aiptasia -- now also removed!). The other two anemones are too small to properly ID, though I'd guess that one is a tiny green bubble-tip anemone.

The number of worms present in the live rock is too great to count - but they too are fascinating to watch as they variously

ABOUT THE AUTHOR

David Midgley

When he's not editing Redfish Magazine, David Midgley is a scientist who has a PhD in Microbial Ecology and works with microbes in the subsurface. He lives in Sydney, Australia with his wife, kids, cats and now - Reef Aquarium.

Assembled live rock: Month 1.

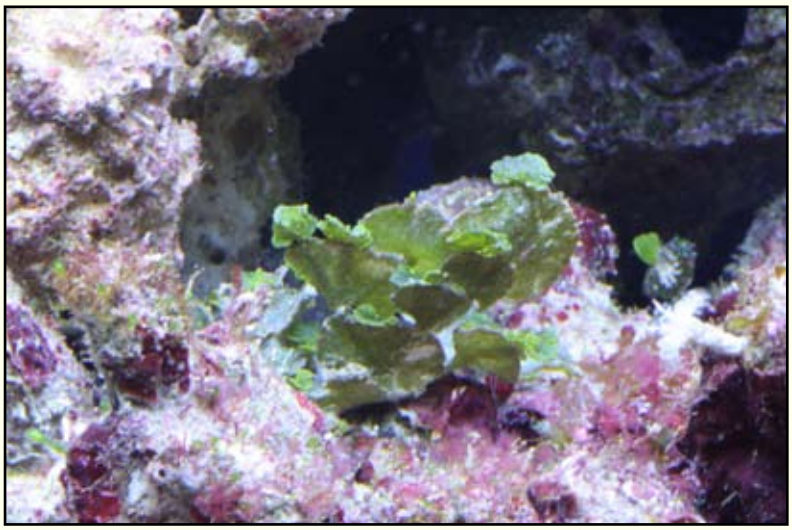
I presume this is a colony of Palythoa, but I'm not sure, suggestions most welcome via our Facebook page!

Glove polyps (*Clavularia* sp.) feeding from the water column.

construct their tube homes from pieces of coral sand or extend their feeding tentacles into the water. They're also fond of ejecting material into the water column - a behaviour I presume is the worm equivalent of emptying your bed pan into the street! The last critters I'm going to mention aren't really critters - they are primitive plants, well, macroalgae. The most obvious species that accompanied the live rock is Halimeda spp. Thus far these interesting simple plants seem to be growing well and producing new "leaves".

Adding live rock to my tank has been an amazing experience. Having come from the freshwater world I can safely say that there is simply nothing like it in freshwater fishkeeping. The strange and varied life that emerges from the rocks is astounding, surprising and interesting. It's also on-going as I'm discovering! New creatures continue to make themselves known to me -- emerging from their hiding places withing the rock -- and that's where I'm at currently: around 14 kg of live rock in the tank, light period limited to a few hours / day and watching ammonia/nitrite levels like a hawk.

Two other coral hitchikers in the aquarium.



***Halimeda* species showing signs of growth.**

In the next entry I'll be discussing the results of these chemical tests, discussing the status of my various live rock hitchhikers and be bringing you an up-to-date assessment of where my aquarium has got to between now and the June issue.

photo by Khantipol

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Gobiosoma evelynae
Photo by Laszlo Ilyes

Marine Gobies

by Aaron Sewell

The family Gobiidae contains more than 2,500 species of marine, brackish and freshwater fish making it one of the largest families of fish. The family is divided into six subfamilies, of which only one (Gobiinae – true gobies) are of particular interest to most marine aquarists. In general, gobies are small fish, ranging from less than 1cm (one of the smallest known vertebrates) to around 50cm with most species remaining under 15cm, making them ideal candidates for aquariums.

Gobies are characterised by their elongated shape, absence of the lateral line (a sensory organ found in most fish, including sharks and rays) which is replaced by sensory ducts around the head as well as modified pelvic fins which are, in most cases, fused and

A Common Ghostgoby (*Pleurosicya* sp.) resting on a sponge in the Lembeh Straits.

Pleurosicya species are not commonly seen in the hobby, though individuals of various species sometimes do become available.

Despite looking a little like gobies, blennies - like this Bath's Blenny (*Ecsenius bathi*) - are not related to gobies in any meaningful way. They are part of a separate suborder of fishes - the Blennioidei.

Mandarin fish are dragonets, not gobies - a distinction which has important implications for their care. Unlike most gobies, dragonets are far more challenging to keep in the aquarium.

function like a suction cup. In most species, the swim bladder is also absent, meaning gobies are almost exclusively substrate dwelling fish. Most gobies are carnivores, feeding on small invertebrates such as crustaceans and worms.

In general, gobies are very hardy fish, not particularly susceptible to disease and tend to take to new food offerings readily. There are exceptions though and it is important to be familiar with the individual species before making a purchase. While generally not regarded as aggressive, gobies will defend their territories, particularly from other substrate dwelling fish. This means that in small aquariums different goby species are not often compatible due to territorial battles and problems may be encountered even in medium to large aquariums depending on the species.

Gobies are demersal spawners, meaning they lay their eggs beneath the substrate with many spawning in burrows that become nests and others spawning beneath rocky substrate. Most gobies guard the nests, usually with both parents sharing the role. For this reason, there have been some success stories with respect to captive breeding of some species. A notable exception are the coral gobies which spawn on the underside of the branches of the coral they are living in.

Goby-like fish

There are several fish encountered in the aquarium trade that are referred to as gobies but actually belong to various other families.

Firstly there are the Mandarin Dragonets (*Synchiropus picturatus* and *S. splendidus*) which are occasionally referred to as mandarin gobies. It is important to note the difference between dragon-

ets and gobies due to the fact that, for the most part, dragonets are far more difficult to keep than gobies. Mandarin Dragonets in particular are extremely difficult to get feeding on prepared foods and require a relatively large, established aquarium with a high population of micro-invertebrates such as copepods.

Then there are the various dartfishes of the family Ptereleotridae, most notably those from the genus *Nemateletris* commonly referred to as fire gobies. These fish share many characteristics with gobies, including body shape and high tolerance of aquarium life. However, dartfishes are not substrate dwellers and gobies tend to tolerate these fish living in close proximity.

Often other fish with the same basic body shape, such as blennies, will be identified within the aquarium trade as gobies though in most cases there are no drastic consequences to this misidentification.

Nemateleotris decora. Photo by TANAKA Juuyoh.

Firefishes and dartfishes arent true gobies, they are part of the sister family - the Ptereleotridae. typically they'll co-exist peacefully with gobies.

Oxymetopon cyanoctenosum. Photo by TANAKA Juuyoh.

Ribbon gobies, like firefish, are not true gobies. This species is very occassionally offered in aquariums, it's large size (20cm) and requirements for a deep substrate in which it makes a burrow make it a more challenging species in many aquariums.

Top: *Valenciennea puellaris*.
Middle: *Valenciennea sexguttata*.

Sleeper gobies and Crab-eye gobies

Though not particularly closely related, the sleeper gobies of the genus V*alenciennea* and the monospecific genus of Crab-eye Gobies, *Signigobius biocellatus*, share some key characteristics.

While the former are among the largest gobies available to aquarists, with species reaching between about 14-20cm, Crab-eye Gobies are slightly smaller reaching only around 10cm. Both genera are noted for their poor captive record due mainly to their unwillingness to accept prepared foods. These fish are sand sifters and obtain their food by taking mouthfuls of sand from the surface layers of the substrate which they sift to capture any small invertebrates amongst the sand. This means that in the aquarium they will often decimate populations of micro-invertebrates. During the early stages after introduction

Twinspot or Crab-eye Gobies, like their cousins in genus *Valenciennea*, can be challenging to feed adequately.

when microfauna is plentiful, these gobies generally fare well. Unfortunately populations are often decimated within a few months and starvation begins.

Some aquarists have success with placing food items including live blackworms, brine/mysis shrimp or even pellets into the sandbed which the gobies will then encounter as they forage. Often, in time the fish will recognise the food even when it is not placed in the substrate and will then begin taking food from the water column.

Anecdotal evidence also suggests these fish fare better if kept as pairs, in which case it is not uncommon for them to spawn in the aquarium. These fish are commonly bought by aquarists looking for a solution to benthic algae problems such as diatoms or cyanobacteria. Unfortunately this often results in aquarists being uninformed as to the requirements of sand sifting gobies which probably contributes to their poor record in captivity.

Clown gobies

Clown or coral gobies of the genera *Gobiodon* and *Paragobiodon* tend to fare well in the aquarium and occasionally survive being inadvertently shipped inside a colony of *Acropora*. These fish are amongst the smallest fish commonly kept by aquarists, reaching around 3-4cm, though the Citron Goby (*Gobiodon citrinus*) may reach 6cm. Clown gobies live almost exclusively amongst the branches of corals such as *Acropora* though in the aquarium they will make use of whatever branching corals are available. Clown gobies will readily accept a variety of small food items including brine shrimp, mysis shrimp, flakes and pellets. Being hermaphrodites, clown gobies will often accept conspecifics in close proximity but individuals may vary and some will become aggressive if they are not given suf-

The rather beautifully patterned Green Clown Goby (*Gobiodon histrio*) is a relatively peaceful, small-sized goby, ideal for the reef aquarium.

Photo by Budi Lukman

The Citron Goby (*Gobiodon citrinus*) is the most commonly collected (and kept) species in the genus, and as pictured enjoys hanging about in the branches of *Acropora* corals. It's superficially similar to its sister species - the Yellow Goby (*Gobiodon okinawae*) and the two species are sometimes sold variously under each others name.

Amblygobius albimaculatus - the Tailspot Hover Goby

ficient space. Given the fact these fish rarely venture outside the coral colony they call home, these fish are ideal for nano reef aquariums.

Hover gobies

The most commonly encountered hover gobies in the aquarium trade are the Dragon Goby (*Amblygobius phalaena*) and the Rainford's Goby (*A. rainfordi*).

The genus, however, contains 14 species and there are others that make their way into the trade on occasion. Unlike most other gobies, the hover gobies do not spend the majority of their time on or under the substrate, instead these fish hover above soft substrate generally within a short dash from the cover of rocky hides. Also unlike most gobies, hover gobies are omnivores, feeding on a combination of filamentous green algae and small invertebrates which they tend to acquire by sifting through the upper layers of the substrate, though

Photo by Rob @ BBM Explorer

Amblygobius hectori - Hectors Goby

ABOUT THE AUTHOR

Aaron Sewell

In 2004 Aaron completed a BSc (Marine Science) at the University of Sydney with majors in marine biology and tropical marine science. Since 2001 he has been involved with the aquarium industry at hobbyist and retail level and now works in aquarium product development. Aaron is a former committee member of the Marine Aquarium Society of Sydney and has collected fish and corals in Fji for the US and European aquarium industries. Aaron has been writing for several local and international aquarium magazines since 2004.

not nearly as ravenously as the afore-mentioned sleeper gobies.

Like the sleeper and Crab-Eye Gobies, though to a lesser degree, hover gobies are commonly noted to lose weight even when they appear to be feeding well. There are suggestions that these fish are particularly prone to intestinal worms (though some studies estimate up to 75% of marine aquarium fish carry intestinal worms) which could explain this phenomenon.

Hover gobies are extremely peaceful fish, less territorial than many gobies, and are well suited to small to medium sized aquariums with other peaceful tankmates.

Watchman/Shrimp gobies

The shrimp gobies of the genera *Cryptocentrus*, *Stonogobiops* and *Amblyeleotris* are among the most sought after gobies in the trade due to their symbiotic relationship with pistol shrimp of the genus *Alpheus*. While the gobies can be kept on their own in an aquarium, the behavioural interactions of the two symbionts are rather interesting. *Alpheus* shrimp have very poor eyesight while shrimp gobies have very good eyesight, therefore the shrimp make use of the gobies as watchmen keeping an eye out for predators. In return, the shrimp work tirelessly to dig a burrow that will often house 2 gobies and 1 or 2 shrimp. While they work, the shrimp will keep one antenna in contact with the goby's tail. If the goby moves suddenly, that is a signal for the shrimp to retreat into the burrow.

Despite the close relationship between these animals, there is absolutely no reason a watchman goby cannot be kept without an *Alpheus* shrimp.

Cryptocentrus lutheri - Luther's Shrimp Goby - guarding its symbiont - an alpheid shrimp.

Flagtail Shrimp Goby (*Amblyeleotris yanoi*) and its partner shrimp (*Alpheus randalli*)

Wheeler's Goby (*Amblyeleotris wheeleri*)

Amblyeleotris randalli - Randall's Shrimp Goby
Photo by Chika Watanabe

Watchman gobies tend to be fairly confident fish despite their size and will often become very boisterous feeders. They will however, often build their burrows in the most secretive locations within the aquarium, usually behind rockwork, which makes them difficult to see outside feeding time. Interestingly, these fish seem to be more adventurous in the absence of shrimp and some species, particularly those from the genus *Cryptocentrus*, will confidently roam the aquarium provided there are no large predators to intimidate them.

Note that there are other watchman gobies such as those from the genera *Vanderhorstia* and *Mahidolia*, though these gobies are extremely rare in the aquarium trade.

Watchman gobies make interesting additions to the reef aquarium. They can be housed without their shrimp symbionts, however, the combined behaviours of the two fish are fascinating to watch. They aren't ideal fish for aquariums with deep sand beds as they create quite deep burrows and can disrupt the functioning of the filter. That said, if you want the best of both worlds a remote sand bed (sand bed in a bucket or in your sump) make good solutions to this potential game changer. They are easy to feed and despite living in the substrate don't sift it for microinvertebrates in the same fashion as sleeper gobies.

Hi Fin Red Banded Goby (*Stonogobiops nematodes*)

Amblyeleotris steinitzi. Steinitz' Prawn Goby

Trimmia species sometimes stow away in liverock. They are small-growing species (mostly less than 50 mm in length), relatively peaceful and reef safe.

A masked Goby (*Coryphopterus personatus*) rests atop a corallimorph. The species is very small growing, reaching only 40 mm in length. It's endemic to the tropical regions of the Western Atlantic, being found south from Florida to northern South America in reef habitats.

Pygmy gobies

Occasionally some of the pygmy gobies of the genera *Trimma* and *Eviota* find their way into the trade. Although they are not usually targeted by collectors, they do occasionally become inadvertently collected along with live rock or corals where they may be hiding. These gobies are exceptionally hardy fish and it is not uncommon for them to survive journeys from the reef to an aquarium store with little more than a dribble of water and residual dampness on the rock or coral they were collected with.

Reaching sizes of between 2-5cm, pygmy gobies are ideally suited to nano aquariums and can get lost if kept in larger aquariums. Like many gobies, pygmy gobies take well to aquarium life and

There are numerous species in the genus *Eviota*, this is probably *E. gutatta* or *E. prasites*, most of which are small sized and well suited for the reef aquaurium. They aren't typically collected specifically but often hitchhike into aquariums with live rock or corals.

The Blue-banded or Catalina Goby (*Lythrypnus dalli*) is a remarkably beautiful subtropical species that is found in waters 18-22° C. Its absence from truly tropical zones may suggest an intolerance of warmer water - or possibly its failure to compete with tropical gobies. Either way, its inclusion in reef tanks at tropical temperatures is somewhat contentious!

Intertidal mangroves are often a home for mudskippers.

Aquariums should emulate this habitat if keeping these fishes is the goal. Many mangrove species will grow in aquarium settings provided suitable substrate and ability for the vegetation to grow up out of the water.

will readily accept any small food items including brine shrimp, flakes or pellets.

Mudskippers

While mudskippers are not a suitable addition to the average marine aquarium, these fish are quite unique and can be kept successfully in a suitably designed species tank. Mudskippers belong to the subfamily Oxudercinae and are unique in their amphibious behaviour and physiology that includes the ability to breathe through their skin, as well as the lining of the mouth and throat, a process known as cutaneous breathing. When housing mudskippers, the aquarium must be carefully designed, ensuring that there are areas within the aquarium where the fish can climb out of the water and also areas where they can rest partially submerged. The latter is the region where mudskippers prefer to forage for food.

Close

As previously mentioned, it is believed that gobies (some more than others) are prone to intestinal worms and in the aquarium, this can be fatal. For species that are particularly noted for symptoms that are likely to be the result of worms, such as those from the genera *Amblygobius*, *Valenciennea* and *Sygnigobius*, quarantine and treatment prior to adding them to the aquarium may be beneficial. Piperazine, praziquantel or lecamisole are suitable options though it is important to research any medication you intend to use.

Despite their generally small size and sedentary lifestyle, gobies make excellent additions to most marine aquariums. On the whole they are tough, entertaining and in many cases, highly attractive fish. From a 30L to a 500L aquarium, there are gobies that make ideal additions to just about any reef aquarium, though as with any fish, considerations should always be made regarding tankmates. While gobies are often boisterous feeders that will fiercely defend their territory, they can be targeted by larger fish.

Mudskippers in Borneo.
Photo by Jon Robson

Interview: Jim Dodd

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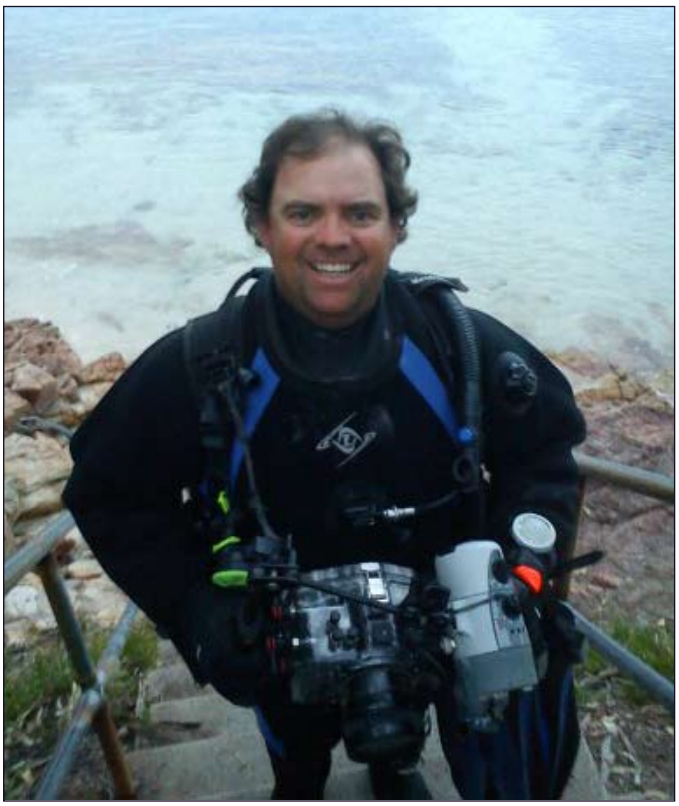
At Redfish we've been admiring Jim Dodd's amazing underwater photography for sometime now. So it's with some excitement that we're able to bring you an interview with Jim accompanied by some of his beautiful photographs. If you're interested in seeing more of Jim's work (and who wouldnt be!) we'd recommend you visit him at his website www.uwphotography.com.au or at his facebook page www.facebook.com/UWPhotography, you won't be disappointed!

A screenshot of Jim's website: UW Photography

Jim is from originally from Sydney, Australia and now lives in Nelson Bay, a town approximately 2.5 hours drive north of Sydney. Jim learned to SCUBA dive in his early 20s and has completed numerous diving courses, including Advanced Open Water, Night Diver, Underwater Navigation, Rescue Diver and in 2003 completed his Divemaster course. Since completing his divemaster course Jim has done nearly 1500 dives. He started underwater photography using a small underwater film camera in 2002. From there he graduated to a Samsung Digimax V3 before upgrading to his current setup, a Nikon D7000 DSLR in an Ikelite housing with a single Ikelite DS 125 strobe which he has been using for the last 5 years.

Ok, so on with the questions!

Redfish: *How did you get into underwater photography? What is your main style? and what do you consider a successful image?*
Jim: *I got into underwater photography in 2003 when I was given a cheap film camera for Christmas. It was addictive showing friends and family my photos, even though they were terrible. It was also expensive buying film and getting it processed. My main style is macro as most of the dive sites around home have small critters. A successful image must have the eyes in focus, preferably both eyes. I like to take extraordinary images of ordinary subjects. For me a successful image is one that inspires empathy*


Jim on the other side of the lens!

and admiration for our fragile marine environment.

Redfish: *From your posts on Facebook it seems like you've dived in many locations - where is your favourite and why?*
Jim: *I have many favourite dive locations. My home town of Nelson Bay is a great area for diving and taking photos as there are lots of small and rare marine creatures here. Julian Rocks at Byron Bay is another favourite due to the number of different species that you find there. I loved diving in Vanuatu on the wreck of the President Coolidge. It is a wreck rich in history from WWII which sank because it hit 2 friendly mines. The captain ran it a ground and saved all but one person before it slipped back into its watery grave. The bow is in about 18m of water while the stern is almost 70m below the surface. Probably my most favourite site is the Neptune Islands 70km off the coast of Port Lincoln, South Australia. This is where I had my most awe inspiring dives to date, when I cage dived with Great White Sharks. I just wanted*

Jim and his wife Cherie also run Ocean Guardians. Ocean Guardians promotes awareness and action to protect the fragile marine environment through a variety of initiatives. If you're interested in the marine environment, we'd recommend you like their facebook page to stay informed!

Small is beautiful, this time a nudibranch.
Red Lined Flabellina (*Flabellina rubrolineata*).

to reach out and touch them, especially the 5.5m long female that swam about 1.5m away from me. Totally awesome!

Redfish: *Do you have a favourite subject to photograph?*
Jim: *As you probably guessed from my last answer I love sharks and the bigger the better. Unfortunately I don't get the chance to dive with them as often as I would like (which is every day). So with that in mind and the fact that I mainly do shore dives inside Port Stephens I mostly photograph nudibranchs (sea slugs) and other small critters. I like to find something small and make it huge to see all its details.*

Redfish: *Are there any marine creatures you would like to photograph - but are yet to successfully capture?*
Jim: *I'd love to photograph whales and whale sharks. It would be amazing to be in the water with these enormous creatures. I also want to photograph pygmy seahorses. But most of all I want to find a new species that is unknown to science.*

Another fascinating nudibranch!

Redfish: *Do you have a favourite photograph?*
Jim: *I have several photos which I like I took myself. The one which comes to mind most is the photo I took of my wife with an Ornate Ghost Pipefish in a Black Coral Tree while competing in the inaugural Sundive Photo Shootout in Byron Bay in 2010. This photo won 1st place in the compact camera category and won me a 4 night 3 day trip to dive with the Great White Sharks.*

My favourite photo from another dive is one by Michael Aw. It was taken during the sardine run off the east coast of South Africa and has 2 birds diving into the water leaving bubble trails through the school of sardines. One bird has a fish in its beak and seems to be posing for the camera.

Redfish: *What equipment do you use?*
Jim: *I use a Nikon D7000 DSLR in an Ikelite housing and lens ports with a single Ikelite DS 125 strobe. My lenses are a Nikon 60mm macro and a Tokina 10 – 17* fisheye.

Jim's wife Cherie admires a Ornate Ghost Pipefish (*Solenostomus paradoxus*) in a Black Coral Tree (*Antipatharia*).

a seal with an injury caused by fishing line around its neck.

a Tasselled Anglerfish, *Rhycherus filamentosus*, sits motionless amongst sponges and kelp, awaiting passing fish!

Redfish: *What is your favourite lens and why?*
Jim: *It would be my Tokina 10 – 17, as it will focus on the subject even it is sitting against the dome port.*

Redfish: *Could you provide our readers with some tips on how to get started?*
Jim: ***Compact -*** *Buy the best camera that you can afford. If you are buying the camera and housing separately make sure there is a housing available for the camera before you buy it and make sure you can add to it. Eg with strobes and wet lenses like a macro and/or wide angle.* ***DSLR -*** *Before you buy your lenses make sure you can get a lens port for that particular lens and your housing. Probably start with a macro lens making sure it will focus at a close range. Lenses that you get when you buy a camera/lens package aren't usually very good for underwater photography. You may be better buying the body only then the lens that you want.*

a diver admiring a Wobbegong Shark

Redfish: *Thanks very much for the opportunity to interview you Jim, your photos are inspirational!*

a seahorse perches amongst kelps and sponges

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Meets 20:00, 2nd Wed. each month. West Pymble Memoric Hall, West Pymble.
> Cumberland
http://ksacumberland.webs.com
Meets 19:30, 3rd Wed. each month. Brennan Park Hall, Smithfield.
> Macarthur
Meets 19:30, 4th Mon. each month. Currans Hill Community Hall, Currans Hill.
> Illawarra
Meets 19:00, 4th Tue. each month. Flinders Community Hall, Flinders.
> Southern NSW
P: 02 4454 0194

Marine Aquarium Society of Sydney
http://www.masa.asn.au/mass/
e: mass@masa.asn.au

New South Wales Cichlid Society (NSWCS)

http://www.nswcs.org.au/
Meets 19:30, 1st Sat. each month, Nuwarra Public School, Moorebank.

New South Wales Cichlid Society (NSWCS) - Illawarra.
Meets 19:30, 2nd Sun. each month, Kanahooka High School, Kanahooka.

0414 513 795 0414 513 795 0414 513 795 0414 513 795 0414 513 795 0414 513 795

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$1200 ONO
Phone: Jimmy Li
, Burwood
only.

ACT

Canberra and Districts Aquarium Society (CDAS)
http://drupal.cdas.org.au/
Meets 19:30, 3rd Tue. each month. Harmonie German Club, Narrabundah.

Canberra Killifish Study Group (CKSG)
http://drupal.cdas.org.au/content/killi-corner

Australian Koi Association
http://www.akakoi.com

South Australia

South Australian Aquarium Society Inc.
http://aquariums.2om.com/

South Australian Native Fish Association
www.sanfa.org.au
sanfa@bold.net.au

Western Australia

Marine Aquarium Society of WA
www.masa.asn.au/maswa/
maswa@masa.asn.au
phone:
Chris Sutton
0419 858 108

Perth Cichlid Society
www.perthcichlid.com.au

Koi Society of WA
www.koiclubwa.com
Meets 19:30, 4th Wed. each month. Rotary Hall, South Perth.

ADVANCED AQUARIST
http://www.advancedaquarist.com/

Victoria

Aquarium Society of Victoria
http://asofv.com.au/

Marine Aquarium Society of Victoria (MASOV)
http://ozreef.org/masov.html
e: dbw@ozreef.org

Eastern Districts Aquarium Society
http://www.edas.com.au/
Meets 4th Fri. each month, Willis Rm, Council Offices Nunawading.

EDAS plant study group
http://www.edaspsg.org/

Queensland

MARINE AQUARIUM SOCIETY OF REGIONAL QUEENSLAND
http://www.masrq.org
e: info@masrq.org

MARINE AQUARIUM SOCIETY OF QUEENSLAND
http://www.masa.asn.au/masq.php
e: info@masq.ws
P: 07 3261 8582

ANGFA Qld
http://www.angfaqld.org.au

Gold Coast Aquarium Society (GCAS)
http://www.gcas.net.au

Aquarium and Terrarium Society of Queensland
http://www.aandtsociety.org.au
E: aandtsociety@gmail.com

Marine/Reef Aquarium Society
http://www.aandtsociety.org.au
E: aandtsociety@gmail.com

Bella, Norweigan forest.
Lost on 12/05/11
$$$ Reward offered
Contact Don Smith

Queensland Cichlid Group
http://www.qcichlid.org
Meets 20:00, 1st Fri. each month. Bar Jai Hall, Clayfield.

Brisbane Aquatic Plant Study Group
http://bpsg.frell.org/

Tasmania

Tasmanian Aquarium Society

03 6229 8449 03 0

Hobart Cichlid Society
www.tassiecichlids.com

Wide Bay Aquarium Society
wbaqs.com.au/forum/index.php

New Zealand

Federation of New Zealand Aquatic Societies
http://www.fnzas.org.nz/

Internet

Oz fish for sale
http://www.ozfishforsale.com.au

SaltyTank
http://www.saltytank.com

Corkboard courtesy: Christian Guthier

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